

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE
BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES**

In re Application of:	§	
YUDOVSKY, et al.	§	
	§	Group Art Unit: 1763
Serial No.: 10/614,992	§	
	§	
Confirmation No.: 8160	§	
	§	Examiner: Sylvia MacArthur
Filed: July 7, 2003	§	
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MAIL STOP APPEAL BRIEF-PATENTS

Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

APPEAL BRIEF

Applicants submit this Appeal Brief to the Board of Patent Appeals and Interferences on appeal from the decision of the Examiner of Group Art Unit 1763 dated June 7, 2006, finally rejecting claims 3-6, 8-14 and 17-25. The final rejection of claims 3-6, 8-14 and 17-25 is appealed. This Appeal Brief is believed to be timely since mailed by the extended due date of September 26, 2006, as set by mailing a Notice of Appeal on June 26, 2006. Authorization to charge the fee of \$500.00 for filing this brief is provided on a separate fee transmittal. Please charge any additional fees that may be required to make this Appeal Brief timely and acceptable to Deposit Account No. 20-0782/APPM/004191.C1/KMT.

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Real Party in Interest

The present application has been assigned to Applied Materials, Inc., 3050 Bowers Avenue, Santa Clara, California 95054.

Related Appeals and Interferences

Applicant asserts that no other appeals or interferences are known to the Applicant, the Applicant's legal representative, or assignee which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending appeal.

Status of Claims

Claims 3-6, 8-14, and 17-25 are pending in the application. Claims 1-20 were originally presented in the application. Claims 1-2, 7, and 15-16 have been canceled without prejudice. Claims 21-25 were added in Applicants' Response to Office Action dated September 27, 2005. Claims 3-6, 8-14 and 17-25 stand finally rejected as discussed below. The final rejections of claims 3-6, 8-14 and 17-25 are appealed. The pending claims are shown in the attached Claims Appendix.

Status of Amendments

All claim amendments have been entered by the Examiner. No amendments to the claims were proposed after the final rejection.

Summary of Claimed Subject Matter

Claimed embodiments of the invention provide a chamber having a substrate support, an edge ring attached to the substrate support and configured for pin and slot coupling with another removable edge ring positioned above (*see*, paragraph 12).

In the embodiments of independent claim 3, an apparatus is provided, comprising a substrate support 11a, 13 (*see*, paragraphs 12, 26-32, and 38), a first edge ring 15, 15a (*see*, paragraphs 11, 26-30, 32, and 35-41) disposed on the substrate support 11a, 13, the first edge ring 15, 15a, having one or more tapered recesses (recess 5 and slot 6; *see*, paragraphs 38-41), and a second edge ring 4 (*see*, paragraphs 11-12 and 35-41) having one or more matching tapered pins 19 (*see*, paragraphs 38-41) for mating engagement with the one or more tapered recesses 5, 6 of the first edge ring 15, 15a, wherein the first edge ring 15, 15a comprises a purge ring 15 (*see*, paragraphs 38-41).

In the embodiments of independent claim 4, an apparatus is provided, comprising a substrate support 11a, 13 (*see*, paragraphs 12, 26-32, and 38), a first edge ring 15, 15a (*see*, paragraphs 11, 26-30, 32, and 35-41) disposed on the substrate support 11a, 13, the first edge ring 15, 15a having one or more tapered recesses 5, 6 (*see*, paragraphs 38-41) and a second edge ring 4 (*see*, paragraphs 11-12 and 35-41) having one or more matching tapered pins 19 (*see*, paragraphs 38-41) for mating engagement with the one or more tapered recesses 5, 6 of the first edge ring 15, 15a, wherein the second edge ring 4 comprises a shadow ring 4 (*see*, paragraphs 38-41).

In the embodiments of independent claim 5, an apparatus is provided, comprising a substrate support 11a, 13 (*see*, paragraphs 12, 26-32, and 38), a first edge ring 15, 15a (*see*, paragraphs 11, 26-30, 32, and 35-41) disposed on the substrate support 11a, 13, the first edge ring 15, 15a having one or more tapered recesses 5, 6 (*see*, paragraphs 38-41) and a second edge ring 4 (*see*, paragraphs 11-12 and 35-41) having one or more matching tapered pins 19 (*see*, paragraphs 38-41) for mating engagement with the one or more tapered recesses 5, 6 of the first edge

ring 15, 15a, wherein the first edge ring 15, 15a includes one tapered recess 5 and one diametrically positioned tapered slot 6, and wherein the second edge ring 4 includes two tapered pins 19 diametrically positioned for mating engagement with the recess 5 and the slot 6 (see, paragraphs 38-41).

In the embodiments of independent claim 8, an apparatus is provided for processing substrates, comprising a chamber, a substrate support 11a, 13 (see, paragraphs 12, 26-32, and 38) disposed in the chamber, a first edge ring 15, 15a (see, paragraphs 11, 26-30, 32, and 35-41) disposed on the substrate support 11a, 13, the first edge ring 15, 15a having one or more tapered recesses 5, 6 (see, paragraphs 38-41), a second edge ring 4 (see, paragraphs 11-12 and 35-41) having one or more matching tapered pins 19 (see, paragraphs 38-41) for mating engagement with the one or more tapered recesses 5, 6 of the first edge ring 15, 15a (see, paragraphs 38-41), and a chamber body ring 200 disposed on an interior surface of the chamber, the chamber body ring 200 having one or more recesses 202 for supporting engagement with the second edge ring 4 (see, paragraph 42).

In the embodiments of independent claim 17, a method is provided for supporting a substrate in a chamber, comprising positioning the substrate on a substrate support 11a, 13 (see, paragraphs 12, 26-32, and 38) having a first edge ring 15, 15a (see, paragraphs 11, 26-30, 32, and 35-41) disposed around a substrate supporting surface, the first edge ring 15, 15a having one or more recesses 5, 6 (see, paragraphs 38-41), and positioning a second edge ring 4 (see, paragraphs 11-12 and 35-41) above the first edge ring 15, 15a, wherein the second edge ring 4 has one or more pins 19 (see, paragraphs 38-41) for mating engagement with the one or more recesses 5, 6 on the first edge ring, and wherein the first edge ring comprises a purge ring 15 (see, paragraphs 38-41, Figures 7 and 10-11).

In the embodiments of independent claim 18, a method for supporting a substrate in a chamber, comprising positioning the substrate on a substrate support 11a, 13 (see, paragraphs 12, 26-32, and 38) having a first edge ring 15, 15a (see, paragraphs 11, 26-30, 32, and 35-41) disposed around a substrate supporting

surface, the first edge ring 15, 15a having one or more recesses 5, 6 (*see*, paragraphs 38-41), and positioning a second edge ring (*see*, paragraphs 11-12 and 35-41) above the first edge ring 15, 15a, wherein the second edge ring 4 has one or more pins 19 (*see*, paragraphs 38-41) for mating engagement with the one or more recesses 5, 6 on the first edge ring 15, 15a, wherein the second edge ring comprises a shadow ring 4 (*see*, paragraphs 38-41, and Figures 7 and 10-11).

In the embodiments of independent claim 19, a method for supporting a substrate in a chamber, comprising positioning the substrate on a substrate support 11a, 13 (*see*, paragraphs 12, 26-32, and 38) having a first edge ring 15, 15a (*see*, paragraphs 11, 26-30, 32, and 35-41) disposed around a substrate supporting surface, the first edge ring 15, 15a having one or more recesses 5, 6, and positioning a second edge ring 4 (*see*, paragraphs 11-12 and 35-41) above the first edge ring 15, 15a, wherein the second edge ring 4 has one or more pins 19 (*see*, paragraphs 38-41) for mating engagement with the one or more recesses 5, 6 (*see*, paragraphs 38-41) on the first edge ring 15, 15a, wherein the first edge ring 15, 15a includes one tapered recess 5 and one diametrically positioned tapered slot 6, and wherein the second edge ring includes two tapered pins 19 diametrically positioned for mating engagement with the recess 5 and the slot 6 (*see*, paragraphs 38-41, and Figures 7 and 10-11).

In the embodiments of independent claim 20, a method for supporting a substrate in a chamber, comprising positioning the substrate on a substrate support 11a, 13 (*see*, paragraphs 12, 26-32, and 38) having a first edge ring 15, 15a (*see*, paragraphs 11, 26-30, 32, and 35-41) disposed around a substrate supporting surface, the first edge ring 15, 15a having one or more recesses 5, 6, positioning a second edge ring 4 (*see*, paragraphs 11-12 and 35-41) above the first edge ring, wherein the second edge ring has one or more pins 19 (*see*, paragraphs 38-41) for mating engagement with the one or more recesses 5, 6 (*see*, paragraphs 38-41) on the first edge ring 15, 15a (*see*, paragraphs 38-41, Figures 7 and 10-11), and flowing a purge gas around the substrate during substrate processing (*see*, paragraphs 30-31).

In the embodiments of independent claim 21, an apparatus for processing a substrate, comprising a substrate support 11a, 13 (*see*, paragraphs 12, 26-32, and 38) having a surface contacting a first surface of a substrate, a purge ring 15, 15a (*see*, paragraphs 11, 26-30, 32, and 35-41) disposed on the substrate support 11a, 13, the purge ring 15, 15a having one or more tapered recesses 5, 6 (*see*, paragraphs 38-41), and a shadow ring 4 (*see*, paragraphs 11-12 and 35-41) having one or more matching tapered pins 19 (*see*, paragraphs 38-41) for mating engagement with the one or more tapered recesses 5, 6 of the purge ring 15, 15a (*see*, paragraphs 38-41), wherein the shadow ring 4 overhangs a portion of a second surface of the substrate and the second surface of the substrate is opposite the first surface of the substrate (*see*, paragraphs 35 and 43).

Grounds of Rejection to be Reviewed on Appeal

1. Claims 3-6, 8-14 and 17-25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by *Cheng, et al.* (EP 0553691).
2. Claims 3-6, 8-14 and 17-25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by *Koai, et al.* (US 6,159,299).

ARGUMENTS

A. Rejection of Claims 3-6, 8-14 and 17-25 over *Cheng, et al.* (EP 0553691).

Claims 3-6, 8-14 and 17-25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by *Cheng, et al.* Applicants have respectfully traversed the rejection based on *Cheng et al.* does not teach, show or suggest a substrate support, a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses, and a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, as recited in claims 3-6, 8-14, and 17-25.

The Examiner states that *Cheng, et al.* teaches a shield ring 50 as a first edge ring and a shield ring 100 as the second edge ring in the Final Office Action dated March 24, 2006. However, the Examiner also states that *Cheng, et al.* teaches the shield ring 50 as a first edge ring and a support means 70 as a second edge ring in the Advisory Action dated June 7, 2006. Applicants respectfully traverse the rejection and submit that *Cheng, et al.* does not teach, show or suggest two edge rings as claimed.

In the first scenario where the Examiner states that *Cheng, et al.* teaches the shield ring 50 as a first edge ring and the shield ring 100 as a second edge ring, Applicants respectfully submit that the shield ring 100 is an example of the shield ring 50 and thus the same as the first edge ring, not an second edge ring for mating engagement the first edge ring. *Cheng, et al.*, discloses that the shield ring 50 may be a multi-unit shield ring 100 comprising an inner ring 102, an adjacent ring 104, and an outermost ring 105, and alignment of these shield rings are through tapered edges in complementary manner, not through pins. (See, column 9, lines 40-55.) Accordingly, *Cheng et al.* does not teach, show or suggest two edge rings, the first edge ring having one or more tapered recesses, and a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, as recited in claims 3-6, 8-14, and 17-20.

In the second scenario where the Examiner states that *Cheng, et al.* teaches the shield ring 50 as a first edge ring and the support means 70 as a second edge

ring, Applicants respectfully submit that the support means 70 of *Cheng, et al.* is not an edge ring. *Cheng et al.* discloses a chamber 2 containing a susceptor 40 (substrate support) with a lift means 48, a shield ring 50, and a shield support means 70. The support means 70 is not located near the edge of a substrate and does not provide any structural interaction or function with the edge of the substrate. In addition, the support means 70 is provided to support the shield ring 50 to the chamber body of the chamber 2 to be rested thereon and maintained in rotational alignment with the shield ring 50, and is not provided to prevent edge deposition near the edge of a substrate.

As stated by *Cheng, et al.*, "A shield ring 50, which normally rest on shield support means 70 in the chamber 2, engages the frontside edge of the wafer 10 when the susceptor 40 and the wafer 10 are raised to a deposition position in chamber 2, as shown in Figures 5 and 6". (See, column 4, lines 23-55.) The support means 70 of *Cheng et al.* is provided to support the movable shield ring 50 by coupling through a beveled or tapered pin 72 and a beveled or tapered slot opening 52. (See, column 7, lines 52-58, column 8, lines 1-25.) Thus, in a normal non-deposition position, the support means 70 is separated away from the edge of the wafer 10 by the shield ring 50; whereas in a deposition position, the support means 70 stays secured to the walls in place and is away from the movable shield ring 50 and thus further away from the edge of the wafer 10 since the wafer 10 are raised up together with the shield ring 50 to be near a gas outlet or shower head 20. (See, column 4, lines 20-33.) Therefore, the shield ring 50 is an edge ring but the support means 70 of *Cheng, et al.* is not an edge ring.

In addition, *Cheng et al.* discloses that the support means 70 could be a circular shoulder, support bracket, or a ring supported by a rigid ring support 76 secured to the bottom wall 8 or the sidewalls 4 of the chamber 2. Comparatively, the support means 70 of *Cheng et al.* may be a chamber body ring, when fabricated as a ring secured to a chamber body or chamber wall (see, column 7, lines 52-58, column 8, lines 1-25); however, the support means 70 of *Cheng et al.* is not an edge ring. Applicants respectfully submit that, contrary to the Examiner's position, simply because the structure of the support means 70 could be a ring coupled to the shield ring 50 does not make the support means 70 to be an edge ring. Accordingly, the support means

70 of *Cheng et al.* is secured to the walls of the chamber 2 and is not an edge ring. *Cheng et al.* does not teach, show or suggest a second edge ring, as recited in claims 3-6, 8-14, and 17-25.

Further, in the example of the shield ring 50 being multi-unit shield rings 100, the shield ring include the inner ring 102, the adjacent ring 104, and the outermost ring 105 to permit a wider shield area as provided by the multiple shield rings, 102, 104, 105 and not susceptible to cracking. (See, column 10, lines 20-32.) Thus, the support means 70 is substantially separated away from the edge of the substrate by the multiple shield rings, 102, 104, 105; the support means 70 is not an edge ring.

Accordingly, *Cheng et al.* does not teach, show or suggest a substrate support, a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses, and a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, as recited in claims 3-6, 8-14, and 17-25. Withdrawal of the rejection is respectfully requested.

B. Rejection of Claims 3-6, 8-14 and 17-25 over *Koai, et al.* (US 6,159,299).

Claims 3-6, 8-14 and 17-25 stand rejected under 35 U.S.C. § 102(b) as being anticipated by *Koai, et al.* Applicants have respectfully traversed the rejection based on *Koai et al.* does not teach, show or suggest a substrate support, a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses, and a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, as recited in claims 3-6, 8-14, and 17-25.

Koal et al. discloses a substrate support 150, a purge ring 280, and an edge ring assembly 200 for a dual-purge flow pattern to be established. (See, Abstract, column 5, lines 1-10 and lines 21-30.) As described in *Koal et al.*, the edge ring assembly 200 is provided near an outer edge of the purge ring 280 and is secured to the purge ring 280 for assisting the purge ring 280 such that a channel 226 can be formed between the purge ring 280 and the edge ring assembly 200 for directing a second purge gas flow 292 therein. The edge ring assembly 200 having rings 220,

230, and 240 is an assembly secured to an edge ring to assist the edge ring. Therefore, *Koal et al.* discloses a first edge ring and a first edge ring assembly attached to assist the first edge ring. *Koal et al.* does not teach, show or suggest a second edge ring for mating engagement with a first edge ring.

As also described in *Koal et al.*, three rings 240, 230, 220 of the ring assembly 200 are bolted together by three centering bolts 271 and are secured to an outer perimeter 280P2 of the purge ring 280 by fastening the three centering bolts 271 with three slots 288 of the purge ring 280. As a result, the ring assembly 200 can rest upon three spacing pins 272 which are screwed into the outer portion 284 of the purge ring 280 as part of the purge ring 280 and the channel 226 can form therebetween for flowing purge gas therein. (See, column 5, lines 64-67 and column 6, lines 1-46.) Therefore, the three centering bolts 271 of *Koal et al.* are provided to bolt three rings together and to secure/fasten the ring assembly 200 to the purge ring 280, and do not provide mating engagement with an second edge ring.

Moreover, *Koal et al.* does not teach, show, or suggest matching tapered pins and tapered recesses. All of the centering bolts 271 of *Koal et al.* on the ring assembly 200 and the slots 288 on the purge ring 280 are not tapered. (See, Figures 2A-2C.) In addition, a bolt ordinarily means an object in a cylinder shape like a bar, a rod, or a screw, not tapered in shape. Accordingly, *Koal et al.* does not teach, show or suggest a substrate support, a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses, and a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, as recited in claims 3-6, 8-14, and 17-25. Withdrawal of the rejection is respectfully requested.

CONCLUSION

The Examiner errs in finding that *Cheng et al.* discloses two edge rings to reject claims 3-6, 8-14, and 17-25 because *Cheng et al.* does not teach, show, or suggest a second edge ring.

The Examiner errs in finding that *Koal et al.* discloses two edge rings with matching tapered pins and tapered recesses to reject claims 3-6, 8-14, and 17-25 because *Koal et al.* does not teach, show, or suggest tapered pins and tapered recesses for mating engagement two edge rings.

Respectfully submitted,



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CLAIMS APPENDIX

1-2. (Canceled)

3. (Previously Presented) An apparatus comprising:

- a) a substrate support;
- b) a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses; and
- c) a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, wherein the first edge ring comprises a purge ring.

4. (Previously Presented) An apparatus comprising:

- a) a substrate support;
- b) a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses; and
- c) a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, wherein the second edge ring comprises a shadow ring.

5. (Previously Presented) An apparatus comprising:

- a) a substrate support;
- b) a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses; and
- c) a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, wherein the first edge ring includes one tapered recess and one diametrically positioned tapered slot, and wherein the second edge ring includes two tapered pins diametrically positioned for mating engagement with the recess and the slot.

6. (Previously Presented) The apparatus of claim 3, wherein the substrate support comprises a purge gas channel.

7. (Canceled)
8. (Previously Presented) An apparatus for processing substrates, comprising:
- a) a chamber;
 - b) a substrate support disposed in the chamber;
 - c) a first edge ring disposed on the substrate support, the first edge ring having one or more tapered recesses; and
 - d) a second edge ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the first edge ring, further comprising:
 - e) a chamber body ring disposed on an interior surface of the chamber, the chamber body ring having one or more recesses for supporting engagement with the second edge ring.
9. (Original) The apparatus of claim 8 wherein the first edge ring includes one or more slots disposed for mating engagement with the one or more tapered pins on the second edge ring.
10. (Original) The apparatus of claim 8 wherein the first edge ring comprises a purge ring.
11. (Original) The apparatus of claim 8 wherein the second edge ring comprises a shadow ring.
12. (Original) The apparatus of claim 8 wherein the first edge ring includes one tapered recess and one diametrically positioned tapered slot, and wherein the second edge ring includes two tapered pins diametrically positioned for mating engagement with the recess and the slot.

13. (Original) The apparatus of claim 8 wherein the substrate support comprises a purge gas channel, and the first edge ring comprises a purge ring.

14. (Original) The apparatus of claim 8 wherein the one or more recesses on the chamber body ring include tapered side surfaces.

15-16. (Canceled)

17. (Previously Presented) A method for supporting a substrate in a chamber, comprising:

a) positioning the substrate on a substrate support having a first edge ring disposed around a substrate supporting surface, the first edge ring having one or more recesses; and

b) positioning a second edge ring above the first edge ring, wherein the second edge ring has one or more pins for mating engagement with the one or more recesses on the first edge ring, and wherein the first edge ring comprises a purge ring.

18. (Previously Presented) A method for supporting a substrate in a chamber, comprising:

a) positioning the substrate on a substrate support having a first edge ring disposed around a substrate supporting surface, the first edge ring having one or more recesses; and

b) positioning a second edge ring above the first edge ring, wherein the second edge ring has one or more pins for mating engagement with the one or more recesses on the first edge ring wherein the second edge ring comprises a shadow ring.

19. (Previously Presented) A method for supporting a substrate in a chamber, comprising:

a) positioning the substrate on a substrate support having a first edge ring disposed around a substrate supporting surface, the first edge ring having one or more recesses; and

b) positioning a second edge ring above the first edge ring, wherein the second edge ring has one or more pins for mating engagement with the one or more recesses on the first edge ring wherein the first edge ring includes one tapered recess and one diametrically positioned tapered slot, and wherein the second edge ring includes two tapered pins diametrically positioned for mating engagement with the recess and the slot.

20. (Previously Presented) A method for supporting a substrate in a chamber, comprising:

a) positioning the substrate on a substrate support having a first edge ring disposed around a substrate supporting surface, the first edge ring having one or more recesses;

b) positioning a second edge ring above the first edge ring, wherein the second edge ring has one or more pins for mating engagement with the one or more recesses on the first edge ring; and

c) flowing a purge gas around the substrate during substrate processing.

21. (Previously Presented) An apparatus for processing a substrate, comprising: a substrate support having a surface contacting a first surface of a substrate; a purge ring disposed on the substrate support, the purge ring having one or more tapered recesses; and

a shadow ring having one or more matching tapered pins for mating engagement with the one or more tapered recesses of the shadow ring, wherein the shadow ring overhangs a portion of a second surface of the substrate and the second surface of the substrate is opposite the first surface of the substrate.

22. (Previously Presented) The apparatus of claim 21, further comprising a chamber body ring disposed on an interior surface of the chamber, the chamber body ring having one or more recesses for supporting engagement with the second edge ring.

23. (Previously Presented) The apparatus of claim 22, wherein the one or more recesses on the chamber body ring comprise tapered side surfaces.
24. (Previously Presented) The apparatus of 21, wherein the purge ring further comprises one or more slots disposed for mating engagement with the one or more tapered pins on the shadow ring.
25. (Previously Presented) The apparatus of claim 24, wherein the purge ring comprises one tapered recess and one diametrically positioned tapered slot, and wherein the shadow ring comprises two tapered pins diametrically positioned for mating engagement with the tapered recess and the tapered slot.

EVIDENCE APPENDIX

No copy of evidence is presented at this time.

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RELATED PROCEEDINGS APPENDIX

No copies of decisions rendered by a court or the Board are included as there have been no related appeal or interference listed on page 4 of this Brief.